510(k) SUBSTANTIAL EQUIVALENCE DETERMINATION
DECISION SUMMARY
ASSAY ONLY TEMPLATE

A. 510(k) Number:
k042946

B. Purpose for Submission:
Addition of rifampin to the Vitek® Antimicrobial Susceptibility Test (AST) System

C. Measurand:
Rifampin ≤0.25 – ≥4 μg/ml

D. Type of Test:
Qualitative AST growth based detection

E. Applicant:
bioMerieux, Inc.

F. Proprietary and Established Names:
VITEK® Gram Positive Susceptibility Card

G. Regulatory Information:

1. Regulation section:
   21 CFR 866.1645 Fully Automated Short-Term Incubation Cycle Antimicrobial Susceptibility System

2. Classification:
   II
3. Product code:
   LON System, Test, Automated, Antimicrobial Susceptibility, Short Incubation

4. Panel:
   83 Microbiology

H. Intended Use:

1. Intended use(s):
   The VITEK® Antimicrobial Susceptibility Test (AST) is intended to be used with the VITEK® System for the automated quantitative or qualitative susceptibility testing of isolated colonies for most clinically significant aerobic gram-negative bacilli, *Staphylococcus spp*., *Enterococcus spp*., *Streptococcus agalactiae*, and *S. pneumoniae*.

   The VITEK® Gram Positive Susceptibility Card is intended for use with the

VITEK® system in clinical laboratories as an in vitro test to determine the susceptibility of *staphylococci, enterococci* and *Group B* and *Group D streptococci* to antimicrobial agents when used as instructed in the "pinsert" and operator's manual.

2. Indication(s) for use:
   This submission is for the addition of the antibiotic rifampin at concentrations of 0.25, 0.5, and 1.5 µg/mL for a calling range of ≤ 0.25 – ≥ 4 ug/ml on the VITEK® Gram Positive Susceptibility Card to provide qualitative results (SIR).

3. Special conditions for use statement(s):
   For prescription use

   Qualitative SIR reading only, MIC results not available

4. Special instrument requirements:
   N/A

I. Device Description:

Each VITEK® test card contains 45 wells. The positive control well determines organism growth without antimicrobial inhibition. A suspension of the isolate to be tested is diluted with 0.45 – 0.5% sterile saline. The VITEK® Card is inoculated with the diluted suspension using a vacuum filling process in the VITEK® Filling Module. After the card is inoculated and placed inside the VITEK® Reader/Incubator, no further handling is required. Organism growth inside the card is optically monitored throughout the 6 – 15 hours incubation cycle.

J. Substantial Equivalence Information:

1. Predicate device name(s):
   VITEK® Gram Positive Susceptibility Card for Gatifloxacin

2. Predicate 510(k) number(s):
   N50510/S143

3. Comparison with predicate:

Similarities		
Item	Device	Predicate
Intended Use	Determine antimicrobial susceptibility to antimicrobial agents	Same
Test Organism	Gram Positive Cocci	Same
Test Card	VITEK® card format with base broth	Same
Instrument	VITEK® System	Same

Differences		
Item	Device	Predicate
Antibiotic	Rifampin at specific concentrations	Gatifloxacin at specific concentrations
Reading algorithm	Unique for rifampin	Unique for gatifloxacin

K. Standard/Guidance Document Referenced (if applicable):

"Class II Special Controls Guidance Document: Antimicrobial Susceptibility Test (AST) Systems; Guidance for Industry and FDA"; NCCLS M7 (M100-S14) "Methods for Dilution Antimicrobial Susceptibility Tests for Bacteria That Grow Aerobically; Approved Standard."

L. Test Principle:

The VITEK® System determines when a well demonstrates growth (positive) based on the attenuation of light measured by optical scanner. Organism growth is expressed as increased turbidity in wells. Optical measurements are taken on an hourly basis. If during the 6 – 15 hour incubation cycle, bacterial growth occurs at levels equal to or greater than a predetermined threshold, regression analysis is utilized, along with the organism's identification, to determine the appropriate MIC value for the antimicrobial. The VITEK® Susceptibility Card test is based on the microdilution minimum inhibitory concentration technique with concentrations equivalent to standard method concentrations. Several parameters based on the growth characteristics observed are used to provide appropriate input for calculations. Discriminate analysis is used to develop the algorithm that determines the susceptibility result for all antimicrobials on the VITEK® system. An algorithm of using the 3 dilutions on the card allows for a calling range of $\leq 0.25 - \geq 4 \mu g/mL$. The AST result must be linked to organism identification in order to determine a category interpretation. A category interpretation (SIR) will be reported.

M. Performance Characteristics (if/when applicable):

1. <u>Analytical performance:</u>

   a. Precision/Reproducibility:

   Ten gram-positive on-scale organisms were tested three times at three sites to

determine within site and site to site reproducibility demonstrating >95% reproducibility.

b. *Linearity/assay reportable range:*
Not applicable

c. *Traceability, Stability, Expected values (controls, calibrators, or methods):*
The recommended QC isolates were tested on every test occasion with the reference method and the VITEK®. The reference method QC results were in range for every day tested. The VITEK® was tested a sufficient number of times to demonstrate that the system can produce QC results in the recommended range. Results demonstrated that the QC organisms had the same mode.

Quality Control Table

ORGANISM	**conc.**	**Reference**	**Vitek®**
S. aureus	≤0.25	77	96
ATCC 29213			
Expected Range:			
0.004 – 0.016 µg/ml			
E. faecalis	0.50		
ATCC 29212	1	28	
Expected Range:	2	48	78
0.5 – 4 µg/ml	4		10

Inoculum density control was monitored using a colorimeter and colony count. This was standardized weekly with all results recorded and in the expected range. Verification was performed during internal testing.

A 0.5 McFarland is used to determine the correct inoculum. Colony counts were performed periodically at each site to demonstrate that the inoculum procedure results were in the expected CFU/ml.

d. *Detection limit:*
Not Applicable

e. *Analytical specificity:*
Not Applicable

f. *Assay cut-off:*
Not Applicable

2. Comparison studies:

   a. *Method comparison with predicate device:*
   A clinical study was conducted at three sites using the VITEK® cards with rifampin and the NCCLS reference agar dilution method prepared as recommended in NCCLS M7 approved standard. Inoculum was prepared with direct colony suspension. The testing included both fresh clinical isolates and stock isolates along with a challenge set with known results. The test device had a growth rate of >90.0%. A comparison was provided to the reference method with the following agreement. Essential agreement was not calculated because the Vitek card contained <5 dilutions of rifampin.

   Summary Table for *Staphylococcus spp.*

	CA Tot	CA N	CA %	#R	Min	maj	vmj
Clinical	**299**	**298**	**99.7**	**7**	**1**	**0**	**0**
Challenge	**77**	**74**	**96.1**	**5**	**3**	**0**	**0**
Combined	**376**	**372**	**98.9**	**12**	**4**	**0**	**0**

   CA-Category Agreement **maj**-major discrepancies
   R-resistant isolates **vmj**-very major discrepancies
   min- minor discrepancies

   CA is when the interpretation of the reference method agrees exactly with the interpretation of the VITEK® results.

   b. *Matrix comparison:*
   Not Applicable

3. Clinical studies:

   a. *Clinical Sensitivity:*
   Not Applicable

   b. *Clinical specificity:*
   Not Applicable

   c. Other clinical supportive data (when a. and b. are not applicable):
   Not Applicable

4. Clinical cut-off:
   Not Applicable

5. Expected values/Reference range:
   Staphylococcus spp. ≤ 1 (S), 2 (I), ≥4 (R)

   The Interpretative criteria, QC isolates and the expected ranges are the same as

recommended by the NCCLS and the FDA. All values will be included in the package insert.

The ability of the VITEK® system to detect resistance to rifampin in *S. aureus* and *S. epidermidis* organisms is unknown because resistant organisms were not available at the time of comparative testing.

N. Proposed Labeling:

The labeling is sufficient and it satisfies the requirements of 21 CFR Part 809.10.

O. Conclusion:

1. The submitted information in this premarket notification is complete and supports a substantial equivalence decision.